Translation of replacement pages 1 to 4 of March 23, 2004

APPARATUS FOR THE DISTRIBUTION OF A RANDOM STREAM OF CYLINDRICAL ITEMS, FOR EXAMPLE DRINKS BOTTLES, INTO SEVERAL LANES

Description

The invention relates to an apparatus for the distribution of a random stream of cylindrical items, in particular drinks bottles, into several lanes in which the items are transported individually one after the other. The apparatus has a transport device for the items, the transport device having one or more driven conveyor belts and side rails. The conveyor belts are generally arranged running parallel alongside each other at a short distance, so that they virtually form a closed transport surface and the items can slide from one conveyor belt onto the other. The apparatus also has a lane divider which includes several dividers which divide the space between the two side rails into individual lanes, the width of which is slightly greater than the diameter of the items, so that the items in the lanes are transported individually one after the other. The lane divider is connected to a driver whereby the dividers are movable back and forth.

Such distribution apparatuses are used in drinks bottling plants between the filling device and the packaging station. The drinks bottles coming from the filling device are firstly collected in a buffer. The buffer consists of an area formed

from several conveyor belts lying parallel which represents a widened section of the transport device. The bottles are transported from this buffer to the distribution apparatus by banking-up pressure. The distribution of the bottles into individual lanes is necessary, as only in this way can the bottles from the packaging station be received and then fitted into boxes or other packaging with a specific number of bottles in each case.

The problem with distribution apparatuses is that the bottles can become wedged or form bridges and then are no longer taken along by the transport device.

A distribution apparatus is known from US 4 173 276 in which the dividers are fixed at their downstream end and attached at their upstream end to a bracket which spans the transport device and is movable back and forth.

A distribution apparatus is known from EP 1 038 808 in which the random stream of bottles is distributed into four lanes. Three dividers are arranged between the two side rails, the middle one projecting somewhat further forward. The front ends of the dividers are developed as a swivellable flap, moved by a motor. Sensors serve to detect a blockage of the items and when a blockage occurs the flaps are swivelled by the motor.

A similar distribution apparatus is known from DE-C2-39 26 735, the bottles being distributed into eight parallel lanes

lying alongside each other. The front ends of the dividers are arranged staggered and the middle divider projects furthest forward. In order to facilitate the entry of the bottles into the lanes the dividers can move transversely to the transport device.

Plastic (PET) bottles, because of their elasticity and the greater friction coefficient of plastic, have a particularly marked tendency to become wedged against one another and thus cause a blockage.

The object forming the basis of the invention is to create an apparatus for the distribution of a random stream of items into individual lanes which largely prevents the appearance of such blockages also in plastic bottles.

According to the invention, this object is achieved in that the lane divider has a frame, to which the dividers are fixed, and that the dividers are moving back and forth simultaneously in the direction of transport and transversely to it.

The dividers are fixed to a common frame which is arranged above the transport device. The dividers can be plates or rails composed of individual rods which are suspended from the frames, so that they are at a short distance above the transport device. In general the dividers run parallel to the direction of transport. They can however also run at an angle.

Rollers with a diameter of a few millimetres extend along the upstream-side edges of the dividers.

The speed of transport is in general set such that the items accumulate in front of the lane divider. This is achieved by having the transport device advance the items more quickly than they are processed in the following packaging station. The items are thereby under banking-up pressure. As a consequence of the banking-up pressure the circular items correspondingly arrange themselves to correspond to a two-dimensional hexagonal spherical pack.

In order that the items can distribute themselves into the individual lanes, the lateral distance between the rails must be slightly increased in front of the dividers. This increase begins approximately at a distance in front of the divider which corresponds approximately to the diameter of the items.

The middle divider projects preferably against the direction of transport and the front ends of the dividers arranged laterally thereof are offset staggered to the rear. The increase in the distance between the side rails is developed stepwise corresponding to this stagger. The height of the steps results in each case from the additional space required by the items when they pass out of the hexagonal close packing into the individual lanes, the thickness of the dividers also having to be taken into account. The step height therefore corresponds to approximately 10 to 30 % of the diameter of the

items. The distances between the side rails is preferably not widened at two right angles, but in the manner of a groove in an eighth- to a quarter-arc of a circle. The side rail thus bends outwards at an angle of 10 to 30 % at first and then runs on a section of an arc of a circle until it again runs parallel to the direction of transport.

The dividers are moved back and forth in the direction of transport and transversely to it at the same time. The dividers are mounted on a common frame. This frame is expediently housed swivellable about a fulcrum at the rear, downstream end. An arm extends from the frame against the direction of transport and the front, upstream-side end of the arm is moved in the direction of transport and transversely to it by means of a cam gearing. The housing of the downstream-side end of the frame is developed such that a displacement of the frame in the direction of transport by a short distance of for example 15 mm is possible.

The cam gearing preferably consists of a star wheel with three or four teeth, the tips of the teeth being connected to a curved line as in a Maltese cross. This cam disk is driven by a motor. A roller at the upstream-side end of the arm rests against the cam disk and can for example be prestressed against the cam by means of a spring. At a distance of approximately 1/3 to 1/4 of the diameter of the cam disk an eccentric bolt is attached which protrudes into an elongated slit. When the cam disk turns the arm is thereby swivelled

back and forth transversely to the direction of transport. Because the roller lies against the periphery of the cam disk, the arm and thus the dividers are moved back and forth in the direction of transport at the same time, as often as corresponds to the number of teeth of the cam disk. Thus, if the cam has four teeth, the back-and-forth movement transversely to the direction of transport is overlaid by four

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Claims

1. Apparatus for the distribution of a random stream of items (10) into several lanes (11 to 16) in which the items (10) are transported individually one after the other, comprising a transport device (20) for the items (10) which has one or more driven conveyor belts (22) and side rails (24), a lane divider (30) which has several movable dividers (34) which divides the stream of transported items (10), and a device (40) for driving the lane divider (30), by which the dividers (34) being movable transversely to the direction of transport, characterized in that the lane divider (30) comprises a frame (32), to which the dividers (34) are fixed, and that the dividers (34) carry out a back and forth movement simultaneously in the direction of transport and transversely to it.

2. Apparatus according to claim 1, characterized in that the middle divider (34) projects against the direction of transport and the side dividers (34) are set back staggered.

3. Apparatus according to one of claims 1 to 2, characterized in that the distance between the side rails (26, 36) is increased stepwise in the direction of transport, the increase commencing at a point which corresponds

approximately to the diameter of an item (10) in front of the tip of the frontmost divider (34).

4. Apparatus according to claim 3, characterized in that the steps (28, 29, 38) are rounded in a grooved manner.

5. Apparatus according to one of claims 1 to 4, characterized in that the rail is divided and the part (36) of the rail in the area of the lane divider (30) can be moved outwards.

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A B S T R A C T

The apparatus serves to distribute a random stream of items (10) into several lanes (11 to 16) in which the items (10) are transported individually one after the other. The apparatus has a transport device (20) for the items (10) which has one or more driven conveyor belts (22) and side rails (24) as well as a lane divider (30) which has at least one divider (34) which divides the stream of transported items (10), the divider (34) being movable, and a device (40) for driving the lane divider (30), so that the at least one divider (34) carries out a back-and-forth movement in the direction of transport and/or transversely to it. The lane divider (30) can have a frame (32) to which several dividers (34) are fixed. The middle divider (34) can project against the direction of transport and the side dividers (34) can be set back staggered.

(Fig. 1)